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WASTE TREATMENT PLANT, GLENWOOD, MINNESOTA

Illinois University
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PROGRESS REPORT

WASTE TREATMENT PLANT

GLENWOOD, MINNESOTA

APRIL - NOVEMBER, 1967

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Our last progress report included data up through April, 1966. The following is a report of data obtained from April 30 through November 30.

In our last report we noted that in November of 1966 an unknown substance was discharged into the sewage that carried off our flock and this seriously affected our results for several weeks during last winter. During this period we observed that when nutrient solid media was made using the liquid from one of the sewers, and when streak plates of E. coli were made on plates with this media the counts were much lower than those made on normal media thus indicating clearly that there was something toxic in the sewage. We attempted to determine what this was but with no success. It finally disappeared and the plant began to develop a normal flow in the later part of the winter.

It is also noted last year that the flow of waste was much in excess of what the plant had been designed for. The City employed an engineer to make a survey of the sewer system in an attempt to locate the infiltration. One break in the storm water sewer was found that entered the sanitary sewer system accounting for 75 gallons per minute. However, even after this was corrected we still had excessive infiltration. It was finally concluded that this came from seepage from the lake. It was observed that the lake level was about 2 feet above normal and that a portion of the sanitary sewer system was considerably below the lake level. The high lake level was due in part to a clogged carp trap. This was reported to the Conservation Commission and they cleaned out the trap and since then the flow has gradually decreased. By the end of June the flow dropped to 400,000 gallons per day. However, at no time has the flow reached the the dry weather flow for which the plant was designed -- namely 240,000 gallons per day.

In the accompanying tables are given a monthly average of flow and various analytical data such as COD, BOD, suspended solids in the channel, volume of settable solids in the channel, suspended solids in the effluent, nitrate in the effluent, total nitrogen, etc. Examination of this data shows that reduction of BOD has been excellent. This could be better if a final settling tank had been designed to take care of excessive infiltration.

An examination of Table 2 giving the suspended solids in the channel shows that the best result was obtained when this is kept below 2,000 parts per million (ppm). Relatively poorer results were obtained in October and are probably due to an excessive amount of solids carried in the channel resulting in relatively high solid content in the final tank and high suspended solids in the effluent. The relatively high values for nitrate in the effluent obtained in July and October probably reflect an over aged sludge in the channel. This high nitrate could also be due in part to over aeration.

High values for suspended solids in effluent reflect inadequate settling and if an additional settling tank or a stabilization pond could be provided much more efficient settling of these fine solids could be accomplished. It would result in more efficient removal of nitrogen and possibly phosphate.

It is reasonable to expect that if the suspended solids could be reduced the BOD of the effluent would be consistantly below 10, possibly 5 ppm and the nitrogen removal would approach 90%.

TABLE I

MONTH	FLOW	COD		BOD		%
		RAW	EFFLUENT	RAW	EFFLUENT	REDUCTION
May	502,000	204	69	102	14	85
June	529,000	165	74	83	19	76
July	384,000	250	65	146	6.0	96
August	335,000	213	43	148	10.0	93
September	329,000	230	50	138	8	95
October	330,000	253	68	102	9	92

TABLE II

MONTH	A SUSPENDED SOLIDS IN CHANNEL GM/LITER	B ML SETTLED SOLIDS/LITER AFTER 1 HOUR SETTLING	SLUDGE INDEX B/A	SUSPENDED SOLIDS IN EFFLUENT PPM
May	1.732	199	115	24
June	1.942	167	86	19
July	2.670	198	74	20
August	2.000	261	130	15
September	2.250	400	177	20
October	2.470	705	285	33

TABLE III

MONTH	NITRATE IN EFFLUENT PPM	TOTAL NITROGEN RAW PPM	TOTAL NITROGEN EFFLUENT PPM	% REMOVAL
May	3.8	18.2	7.2	62
June	4.1	17.6	6.6	65
July	7.2	19.2	8.3	58
August	4.1	18.4	5.4	72
September	4.8	22.2	6.8	70
October	10.8	21.7	12.2	42

TABLE IV

MONTH	PHOSPHATE RAW PPM	PHOSPHATE EFFLUENT PPM	% REMOVAL
May	5.7	4.4	22
June	5.2	4.8	8
July	8.5	5.7	33
August	8.8	5.8	34
September	8.0	6.5	19
October	9.0	7.8	13